For Doctor Buxton
from his friend the Au

AN

INAUGURAL DISSERTATION

ON THE

PERSPIRABLE FLUIDS

OF THE

HUMAN BODY.

SUBMITTED TO THE PUBLIC EXAMINATION OF THE

FACULTY OF PHYSIC

UNDER THE AUTHORITY OF THE TRUSTEES OF COLUMBIA COLLEGE, IN THE STATE OF NEW-YORK,

The Right Rev. BENJAMIN MOORE, D.D. President;

FOR THE DEGREE OF

DOCTOR OF PHYSIC,

On the 9th Day of November, 1802.

BY RICHARD L. WALKER,
Of New-York.

The plague is not produced *within* us, but arises from *external* causes.
Sanctorius, Med. Static. Aphorism 129.

NEW-YORK:
Printed by T. & J. SWORDS, Printers to the Faculty of Physic of Columbia College.

1802.

TO

The Hon. DE WITT CLINTON,

RICHARD S. KISSAM, M.D.

AND

EDWARD MILLER, M.D.

THIS

DISSERTATION

Is most respectfully dedicated.

TO

SAMUEL BORROWE, *M.D.*

SIR,

THE time set apart for the completion of my medical education being now terminated, it is with a heart overflowing with the tenderest emotions that I view my separation from you in the capacity of a pupil. In this separation, however, I am supported by the pleasing reflection, that your efforts will never be wanting to promote my future improvement and usefulness.

Having experienced so much of your goodness hitherto, I cannot but hope that your exertions to wrest me from the whirlwind of thoughtless dissipation will be kindly continued.

If I have not improved in a manner equal to your wishes, it cannot be charged to your neglect; and if my improvements had even exceeded the most sanguine expectations of my friends, it would be a return of but small consideration for your faithfulness and attention.

In whatever situation accident or chance may place me, I shall pray that Heaven may for ever confer upon you an uninterrupted course of peace, happiness and success.

Permit me to say, that, during my residence at the New-York Hospital as House-Surgeon, I was treated with that politeness and affability by the visiting surgeons and physicians, which justly claims my grateful thanks.

To the Governors of the Hospital I make grateful and heartfelt acknowledgments. These gentlemen always dis-

played a disposition to cover the indiscretions of inexperienced youth with the mantle of benevolence, and evinced their friendship by a favourable construction of my conduct.

I have to regret, that neither opportunity nor language is afforded me equal to my obligations to the several Medical Professors.

It would here be a pleasing task to take a view of the state of medical learning in Columbia College, but the limits which I have prescribed to myself will not permit. I will, however, observe, that our medical school has sustained an irreparable loss, by the removal of that learned and sound philosopher, Dr. MITCHILL. The young gentlemen of the College sincerely mourn his absence, and think it will be long a subject of regret to the Students of Medicine. I do not mean to censure the proceedings of the Trustees, nor in any manner whatever to inquire into the causes or motives of the removal of that gentleman. But there is no doubt of their having struck off from the catalogue of professors a great scientific guide, who always ably pointed out the road to the candidate for fame, and was eminently calculated to bend the tender mind of youth to improvement and usefulness.

These are not mere compliments lavished by flattery, but truths extorted by the justice due to such an exalted character.

With high respect and esteem,

I acknowledge myself your humble servant,

RICHARD L. WALKER.

AN

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THIS important function of living beings may be advantageously considered in three points of view, to wit:

I. As respects the physiology of perspiration, or its condition during the continuance of health.

II. That part of the function which relates to its pathology, or its state during disease.

III. Such alterations as the perspired fluids undergo by chemical action, *after secretion*, changing to offensive, and often to noxious, and even pestilential compositions.

SECTION I.

Of the Perspiration in a State of Health.

IT is discovered by anatomy that the large arteries of the body divide and subdivide until

they become almost inconceivably small tubes; they are so wonderfully minute that they escape the sharpest sight, and when divided, as in a fresh wound, present to our view nothing but an appearance of gore. Injections, skilfully thrown into the vessels of the dead subject, duly prepared, have demonstrated the wonderful intertexture of them which exists in every part. These hollow pipes, destined to conduct the blood through the body, circulate that vivifying fluid to the viscera, to the organs of sense, to the brain, to the muscles, and even to the bones, in the requisite quantity, for the wants and uses of these respective parts. To the exterior surface of the body there is also a large distribution of the vessels which transmit the blood. During its passage from the right ventricle of the heart through the pulmonary artery, and back again to the left auricle through the pulmonary veins, this ruddy fluid undergoes several striking changes; it loses its dark or purple colour, and turns to a bright or crimson; it acquires caloric from the decomposed oxygen gas of the atmosphere, and becomes sensibly warmer. This caloric, conveyed along with the vital current, through all its channels, imparts warmth to the whole frame, and thus sustains animal heat even in the extreme parts. During its passage through the lungs, the blood also receives a portion of oxygen and

light; these mingling with the sanguine current, are the peculiar agents in striking the bright colour, and of turning the blood to an animal oxyd. And while this process is going on, the chyle lately received from the thoracic duct, and not yet effectually incorporated with the blood, is so completely mingled as to be fairly assimilated with its mass.

In passing through the pulmonic vessels the blood also loses something; a portion of its phlogiston passes off, and, uniting with a part of the oxygenous air within the bronchia, forms the oxyd of phlogiston or water. And a portion of the superfluous carbone passing off and combining with another part of the bronchial oxygen, turns to carbonic acid. The former of these, volatilized by caloric, turns to halitus or watery vapour; while the latter, operated upon by the same agent, is converted to carbonic acid *gas*. Both of these are known to be formed plentifully during the respiratory process.

Thus, while we breathe we receive into our lungs some beneficial agents, to wit, chyle, oxygen, light and heat; and we part with some whose existence in *too great* quantity would injure us, phlogiston and carbone. By these means the venous blood is changed to arterious; and being thus charged with both stimulant and nutritive materials, it is carried by the left ven-

tricle of the heart into the aorta, to excite, warm, and nourish every part of the body.

From this fluid circulating through the arteries and veins all the secretions of the body are derived. It contains the elements or materials whence the bile, semen, saliva, tears, lymph, urine and other secreted humours are formed; and from the same source proceed the fluids which exhale from every pore and transuding orifice of the skin. This exterior covering is remarkably supplied with blood vessels; and by the instrumentality of these, a very large quantity of the aqueous part of the blood is carried off into the surrounding air. While this function is going on, the effete and vapid portions of the blood are discharged from the vessels, and no longer remain within them to overcharge and oppress the constitution; while the superabundant caloric is carried off, converted from a sensible into a latent state, whereby the body is rendered cooler, an equilibrium of warmth is preserved, and feverishness prevented.

These secreted fluids are of three kinds: 1st. That which takes place from the whole surface of the skin, called *Cuticular Perspiration;* 2d. The discharge from the trachea and bronchiæ denominated the *Pulmonary Evaporation;* and, 3d. Those fluids which proceed from sores and ulcers, known by the name of *Purulent Discharges.*

On each of these I shall make some remarks in succession.

1. *Of Cuticular Perspiration.*

Physicians seem to have been a long time ignorant of the quantity and extent of this evacuation. It was known, indeed, that occasionally the human body discharged a considerable quantity of watery fluid by sweat; but until the time of SANCTORIUS, the doctrine of insensible perspiration seems not to have been understood.

This discerning physician first ascertained, by weight, the quantity of humours which the living body lost through the perspiratory pores. For this purpose he ascertained by the balance how much food and drink he took in, and how much was discharged sensibly by the different excretory outlets: And having found that the measurable and palpable excreta fell considerably short of the ingesta, he concluded that the principal part of the deficient portion was carried off by the cuticular exhalation.

This discharge from the surface of the skin has been divided into two kinds. 1st. The Insensible or Sanctorian Perspiration. 2d. The Sensible Perspiration, or Sweat.

Of the Insensible Perspiration.

When the cold edge of a polished razor, or other bright metal, is applied to the surface of

the skin in dry winter weather, the insensible perspiration can be sometimes seen to condense on the side of the instrument: it even seems to be protruded from the body with considerable force. When horses are driven violently in very cold weather, their insensible perspiration is condensed by the ambient air, and changed to visible vapour. This insensible perspiration can also be smelled to considerable distances in certain cases: for example; when exhaling from the skin of a Negro it is frequently very rank and offensive; and even from the most delicate body, it is strong and odorous enough to be scented by dogs. A spaniel will follow his master's track among a thousand men. In this probably he distinguishes some peculiar effluvium not emitted by any other man; and sportsmen remark that a pack of hounds will pursue a fox very well when running several rods to leeward of that animal's track. The wind, in this case, seems to waft the perspired matter to their nostrils.

Thus it appears that there is an exhalation from the animal skin of considerable weight and peculiar flavour: from this the shirts and garments next the skin acquire their peculiar taint and foulness. If a shirt be worn next the skin of an healthy person, who perspires only, but without exuding sweat, in a sensible form, it gradually grows unclean. This foulness is im-

parted to it from the skin, and to the skin it is derived from the secretory arteries; whatever, therefore, the exhaling vessels impart to the cutis vera is communicated to the epidermis, and from this latter to the shirt, drawers, stockings, or other garment next to the body. By a long series of wearing in contact, the cuticle and garment not only grow foul, but become very uncomfortable and disagreeable to the cutis vera, which is highly sensible. Hence arises irritation of the surface, with sometimes an appearance of pimples in various parts. Sometimes the confined perspiration excites fretting and chafing of the skin; and not unfrequently a too long confinement of it upon the unclean body gives rise to the itch, or increases the predisposition to that disease.

The uncomfortableness of having the exhaled fluids of the skin thus incessantly condensed upon it, has led to the practice of anointing with oil to counteract their degeneracy to poison, and of purifying with alkalies to remove them entirely away.

That sensation which is imparted to the human skin by unction with oil, is far more agreeable to it than that which is communicated by its own excretions. Indeed, a quantity of oily or greasy matter is secreted by the healthy skin, and besmears its surface. Those parts of the body

which are not clothed nor washed, give ample proof of this: the hairy scalp is always supplied with an adipose secretion evident to any one; and the like obtains in the other parts of the skin. Savage nations, who are scantily clothed and wrapped in furs and mantles of skins, daub themselves with fat or oil to remove the disagreeable sensations occasioned by their own filth, and they find great relief and comfort in it: to a person accustomed to clean linen, this seems an extraordinary custom; but it was and is of great utility among people who employed a different dress from that which is commonly worn in more refined life: indeed, so strongly were many of the ancients attached to these greasy applications, that they made use of them at length for the purposes of luxury. Their unguents were highly perfumed; they expended great sums in the purchase of them; and there was a class of persons, called Iatroaliptæ, who made it a profession to apply and rub them on; even in the time of our Saviour precious ointments were in use.

The employment of oil after bathing, and to soften the skin and limbs of the athletæ and others devoted to gymnastic exercises, evince the care and assiduity with which they were applied in ancient times; nor is it to be doubted that the extreme unction recommended by St. James to

be applied to a person desperately sick, might have been serviceable by a medical as well as a spiritual operation.

Where a more accurate system of cleanliness than could be procured by oily and greasy things was desired, water was employed; and hence we derive the practical benefits of frequent washing of the body among many nations of the earth. And where few clothes are worn, as among the natives of some parts of Africa, and of the warm South Sea Islands, washing with water wlll answer all the purposes of cleansing the skin and keeping it comfortable and healthy; but where it is fashionable to cover all the parts of the body, except the face and hands, with clothing, the perspired matter cannot escape freely into the atmosphere, but must be entangled in the texture of the garments; the dress grows rapidly foul, and water, in order to make them clean and healthy, must be sharpened by soaps, leys, and alkaline salts. Hence we become acquainted with the qualities of the insensible perspiration, not commonly evident in the first instance *per se*, but tincturing the cuticle and the garments, and in process of time vitiating them with the most foul and unhealthy taints.

Of the Sensible Perspiration, or Sweat.

When the body is exposed to more than ordinary heat, or is made to undergo exercise more

severe than usual, the surface of the skin grows moist, and if the heat or exercise be continued, it grows wet by the effusion of a watery fluid; this either overspreads the cuticle in the form of dew, or gathers and trickles down in the consistency of large drops; these are often so copious as to fall from the forehead and face to the ground, and to render the clothes which enwrap the body as wet as if they had been dipped in water.

This effusion is what is properly called *sweat*. It is said to have been employed as the token of exertion, exposure and toil, when man forfeited his innocence and fell into a sinful state. Physiologically considered, sweating, when moderate, has several salutary effects; it relieves the body from too large a mass of circulating fluids, which, if kept for ever in the vessels, would injure by inducing a dangerous plethora. It has a happy tendency to relieve the kidneys and bladder from secreting and carrying off excessive quantities of urine; for, generally speaking, there is a great sympathy between the skin and kidneys. When sweat is copious, the quantity of urine is proportionally small; and when the cuticular discharge is lessened, the secretion by the kidneys suffers a corresponding increase: by this correspondence of the parts to each other great advantage is gained, and the wear and tear of the urinary passages

are so far lessened or prevented; and this economy is the more remarkable, as in men the urinary organs are among the first to fail, or become unfit, through natural decay, to perform their proper functions.

Sweating also answers another important purpose; it cools the body, and thereby obviates the disagreeable consequences of the animal heat accumulating in the lungs. Suppose it to be true that a gallon of atmospheric air is deprived of its oxygen by a healthy man in the course of a minute; one third of this air is supposed to be oxygenous gas; in this gas, a great quantity of caloric exists, though concealed in a latent state: to this latent caloric, the oxygenous and even the atmospheric air owe their permanent elasticity; but in the function of respiration the oxygenous gas is decomposed; and while its heat and light pass through the membranes and vessels of the lungs, to mingle with the blood and render it arterious, its caloric, now converted from a latent to a sensible state, accompanies the vital and crimson current, and conveys warmth to every part of the body, however remote. Thus the process of breathing turns the latent heat of oxygenous air to sensible heat, and bestows it upon the living body, vivifying and cherishing the inward parts, and thence travelling to the exterior surface.

This decomposition of oxygenous air, and the

consequent evolution of caloric, goes on, unremittingly, during the times both of sleeping and waking. The quantity of caloric extricated within the lungs is prodigious. So great a quantity, and so high a degree of it is collected, that unless some discharge or outlet was provided for its surplus, the most dangerous consequences would ensue; but the bounty of the Creator has provided such an outlet. Every cuticular pore or duct discharges a portion of insensible perspiration, and at times pours forth a quantity of sweat, which conveys from the system inordinate quantities of heat.

The insensible perspiration, like other vaporific fluids, derives its aëriform quality from the latent heat which it contains: the quantity of this is very considerable, and the whole of it is derived from the sensible heat of the skin. In the process of evaporation, therefore, there is a large abstraction of the sensible heat of the body, and this changing into a latent state, goes off with the sanctorian halitus, and produces the sensation of coolness or cold upon the surface from which it escaped.

What happens to the perspiration, happens eventually to sweat: though some of it may be absorbed by the lymphatics, the greater part of it, when not entangled by the clothing, gradually changes to a vaporific form; in doing so it takes

up a great proportion of sensible caloric, and renders it latent; and to this operation is to be ascribed the coolness, and even cold experienced by a person who sits still, especially in a current of air, after having been brought into a profuse sweat by preceding exercise. By these means is the human constitution enabled to dispose of the superfluous caloric which would otherwise accumulate and continually overheat, and eventually, perhaps, consume the body. The inconvenience of defective perspiration may be judged of by the troublesome effects of the partial accumulation of heat, during the hot fit of an intermitting fever, and of the rapid cessation of it when sweat breaks out.

The qualities of sweat, when chemically examined, seem to be nearly the same with those of the insensible perspiration. Indeed, the latter appears to differ from the former but in degree, being only a more gentle and moderate evacuation of the same kind.

2. *Of the Evaporation or Respiratian from the Lungs.*

It has been computed that the area of all the ramifications of the wind-pipe, its branches and cells in the lungs, is equal to the area of the whole external surface of the body: these are distributed throughout that viscus in such great numbers,

that the calculation does probably not go beyond the truth: into these openings within the thorax, the atmospheric air is freely admitted through the mouth and glottis, and agitates them with an alternate rising and depression. Hence these internal extensive surfaces, visited and ventilated so constantly and completely, are considered, in fact, as external surfaces *affected by air*.

Like the external parts of the body, these internal surfaces of the lungs exhale a watery vapour; this is so considerable in quantity as to be very perceptible in the form of mist in cool weather; and when the air is very cold in northern regions, during the rigour of winter, this halitus turns to ice on the bed-clothes near the mouth and nostrils, or even freezes into icicles in the same vicinity. During the warmth of summer, this watery vapour flies off in a form less evident indeed to the eye, but still capable of imparting its moisture to any bibulous and attractive material. It is not certain what the quantity thrown off from the lungs may actually amount to, but there can be no doubt that it is equally copious with the exhalation from the whole of the cuticular surface.

It is probable that this secretion originates from two sources:

1st. A part of it is in all probability furnished from the bronchial arteries. They seem to termi-

nate in glandular orifices or excretory ducts, or open mouthed exhalents, as the blood vessels of the skin do; and there can be no reasonable doubt that they perform a similar function. As far then as the bronchial vessels contain and convey blood, may they be considered as furnishing their quantum of perspired matter in the form of pulmonary halitus. There is also the strongest analogy to support a belief, that, as far as their powers extend, the bronchial arteries are concerned in preparing perspirable matter, exactly as the arteries of the skin are; but these arteries are too small to secrete the whole of the pulmonary halitus: the quantity of blood which they convey is not sufficient to afford so large an amount of aqueous vapour; therefore, in the economy of the animal frame, it is wisely provided, that the lungs may furnish an additional quantity of halitus or perspiration by another process.

2d. The other part of the halitus of the lungs is probably formed by a chemical process. Among the researches of modern science, there is scarcely a more brilliant discovery than that of the physical constitution of water; they who have made experiments on the subject declare that if eighty-five parts of oxygen are chemically combined with fifteen of phlogiston (hydrogen), the product will be clear and pure water; and the common modes by which they are brought into this strict

connection are the processes, 1st. Of inflammation, where the phlogiston of blaze, combined with a portion of atmospheric oxygen, turns to water; and, 2d. Of electrical explosion, where the artificial spark, or the natural lightning, passing through mixtures of inflammable and oxygenous gases, brings them into contact, by forming the gaseous oxyd of phlogiston or water.

But in the animal body there seems to be another mode of forming water. By means of *vascular agency* in the living machine, the constituent parts of water are made so to approximate as to be within the attractive distance of each other, and the consequence of such coalition is water. Now, if it can be shown that oxygen and phlogiston exist in the lungs, and come within reach of each other, there will be no difficulty in comprehending how they may contribute towards the formation of pulmonic halitus.

The blood gathered from all parts of the body in the vena cava, and flowing back to the right auricle of the heart, is loaded with a great surplusage of phlogistic (hydrogenous) matter, which the good of the constitution requires to be thrown off in part, or disposed of. The retention of too much of this would tend to deteriorate the health of the animal, whose blood was thus overcharged with phlogiston, or the basis of water.

To remedy this inconvenience the pulmonary

structure is remarkably vascular, open and porous; and through outlets or passages too small for blood and ordinary fluids to pass, the phlogiston can go off in the most ready and easy manner; and through this vascular and membranous compass it seems actually to make its escape from the venous blood, without producing the smallest disorganization or disturbance.

But if this was all, the phlogiston so exhaling from the blood of the vena cava now circulating through the pulmonary arteries, would combine with caloric, and escape through the glottis in the form of inflammable air. But there is another provision in this case; oxygenous air is inspired through the mouth and nostrils, and penetrates the innermost recesses of the lungs. Here this vivifying gas, meeting with nascent phlogiston, in the act of escaping from the blood, unites with it in the most intimate connection, and thus forms an additional quantity of water. This portion of water, added to that produced by ordinary secretion, makes up the amount of the pulmonic halitus.

The water, so formed in the bronchial extremities of the wind-pipe, does not remain long in a *fluid* form; for the heat of the thoracic region is great enough almost instantly to convert it to a *vaporific* or *gaseous* state; and in this form it mingles with the unconsumed and refluent portion of inhaled atmosphere, and passes, during

the act of expiration, through the natural outlets, to mingle with the great external ocean of air.

The halitus, so produced by a two-fold process, contributes to the preservation of health in nearly the same manner that the perspiration and sweat do. It evacuates superfluous humours; it relieves the urinary organs; and, by carrying away redundant caloric, tends to keep the body cool and comfortable.

It is, however, always to be remembered, that the water so formed by synthesis, instantly becomes the menstruum and vehicle of various animal matters, which impart to the halitus the peculiar qualities for which it is distinguishable. In these particulars it has a near resemblance to the cutaneous perspiration.

3. *Of the Fluids secreted from Sores and Ulcers.*

Where the skin has been removed by wounds, ulceration, or otherwise, the injured and denuded vessels do not dry up; on the contrary, they pour forth a larger quantity of fluids than they effused in their healthy state. Some part of these are reabsorbed, and some portion turn to a scab, but a greater portion of this secretion evaporates and escapes into the surrounding atmosphere.

Every person who approaches a patient labouring under abscess or ulcer, can distinguish by the

smell that the exhalation is considerable, and oftentimes extends to the distance of many feet, and more particularly surgeons and dressers know what great quantities of humours are frequently discharged from sores of this description. So great are they, in many instances, as to taint the air of the room where the patient lies, and to make washing and ventilation absolutely necessary to keep the apartments clean and wholesome.

Finding that contradictory accounts had been published of the qualities of this purulent discharge from sores, I availed myself of my opportunities, as House Surgeon of the New-York Hospital, to make some experiments on the subject. Some had affirmed it to be an alkali, while others had declared it to be an acid. My experiments have led me to adopt the latter opinion, and as I flatter myself they may add to the mass of useful facts, I here republish them from the Medical Repository, (vol. v. p. 85.) They are a sequel of certain experiments to the same point, made by Mr. H. C. KUNZE. The result of my experiments were summed up in the following Letter to Dr. MITCHILL.

"*New-York Hospital, June* 22, 1801.

"SIR,

"I observe the experiments on the *acidity* of the pus discharged from foul and ill conditioned

ulcers, made by Messrs. KUNZE and BROWER, in the New-York Hospital, last November, have been published in London. They are contained in vol. vi. p. 69, 70. of the Medical Review and Magazine; but the account is not near so ample as in the Medical Repository, vol. iv. p. 297, 299. At the end of the account given of these very interesting and instructive experiments, is published a memorandum of some trials made by Mr. BLAIR and Dr. INGENHOUSZ, a few years ago, in the Lock Hospital, on syphilitic matter, with a different result. These gentlemen concluded that the discharges on which they made experiments were of an *alkaline* quality, because the litmus paper which they applied to the venereal pus *turned of a blueish hue.**

"It strikes me there must certainly be some mistake in the recital of these experiments, or in the experiments themselves; for I never heard before that an alkali would turn any delicate vegetable *calour to a blue or blueish;* on the contrary, it commonly changes vegetable blues and purples to a *green,* as acids turn them to a red. The natural colour of litmus is blueish, and in the experiments referred to by Mr. BLAIR, the matter applied having neither an acid nor an alkaline quality, which is often the case, the paper was taken out, without having undergone any change of colour.

* Med. Rep. vol. iv. p. 76.

" The inference, therefore, from their experiments is simply this, that in the trials made *the litmus paper gave no evidence of acidity*. This is doubtless very true, for it is well known to us here, that pus is not *always* acid, but becomes so only in *certain circumstances*, and these *connected with an unhealthy aspect of the ulcer*. Considering Mr. BLAIR's experiments as not warranting the conclusion he draws from them, and, when rightly understood, actually confirming, and not contradicting those published by Mr. KUNZE, I had at first meditated to end my observations here, but as further experiments were called for within a few days, I have made them on some of our surgical patients, and these prove as plainly as the former, that pus *grows sour* within a few hours after secretion on the surfaces of malignant ulcers, and that this appears in *scrophula* as well as in *lues* and *cancer*.

" In the experiments litmus paper was employed as the test, and this was very convertible to red by the action of acetous, sulphuric and other acids. To prevent mistakes, I guarded against the possibility of acidity from lunar caustic, red precipitate, saccharum, saturni, corrosive sublimate, and every thing else that occurred to me, and dressed the ulcers during the experiments with dry lint; I satisfied myself too, that blood was not the cause of the red colour acquired by the litmus.

" My first experiment was on the pus of a venereal ulcer, on the hand of two months continuance. The patient had been three weeks under treatment in the surgeons' ward, and the sore was getting well; yet a piece of the litmus paper put in at ten in the morning, and suffered to remain until half past five in the afternoon, was considerably reddened.

" I next tried an old ill-conditioned ulcer with caries of the tibia. It had been under treatment for a month, and was healing. A piece of paper put upon the fleshy part at ten A. M. and taken out at half past five P. M. was evidently turned red, though perhaps a shade more faintly than the preceding. Then a scrophulous ulcer on the arm was tried, which discharged a great quantity of pus from a sinus. It was of fourteen months duration, and not in a very favourable condition. Paper inserted at ten in the forenoon, and removed at half past five in the afternoon, was changed red, and sensibly deeper than in the last experiment.

" Afterwards a trial was made on a syphilitic ulcer on a woman's leg, of seven months standing, and growing clean. Litmus paper put in at half past eight in the morning, and examined at noon, was evidently changed to a red. In all these instances the blue colour of the litmus was restored by dipping the papers in a solution of carbonate of pot-ash.

" A man came into the hospital with a mortified penis, occasioned by venereal virus, first showing itself in the form of a small chancre not larger than the head of a pin, and having spread, within a few days, over a large portion of the prepuce. This ulcer was in a most foul, offensive and gangrenous condition. Litmus paper put into it was changed to a red in three hours and an half, and the colour was brighter than in any of the former experiments.

" In a case of *common* sore-shin, of eight years standing, a paper put into the ulcer, and soaked in its pus for several hours, underwent no change at all.

" The acidity of pus mentioned by EDWARD HOME, may be opposed to the *alkalinity* supposed to be detected in it by ADAIR CROWFORD.

" Indeed, Sir, the results of these and other experiments were so steady and similar, that I need not trouble you with further details. The pus of certain ulcers appears to me to be an acidifiable basis, and to attract oxygen from the atmosphere: it therefore takes some time to become acid, though this is commonly effected in the course of a few hours. What modification of the septic acid this will turn out to be, I must leave to your consideration. I suppose it must be septic acid, because, when concentrated and plentiful, it corrodes the flesh, stirs up hectic

fever in the individual, and when raised into gas from numerous ulcerated surfaces (which are so many local sources), by the heat of the living body (96 or 98 Fahrenheit), breeds the infection of jail, ship, and hospital fevers, to be communicated to others within its reach.

"It is remarkable how near the truth some great men may come and not quite reach it. Sir JOHN PRINGLE, I observe, found that an *austere acid* was produced by mingling putrid animal substances with bread and other vegetables. (Paper v.) He was satisfied that the fæces humanæ often contain an acid. (Paper vii.) He delivers it as his conviction, that there is a *latent acid in the composition of all bodies*. (Exp. 47.) In foul ulcers and other sores, where the serum is left to stagnate long, the matter, he says, is always acrimonious. And he has proved sufficiently, (Paper i.) that putrid substances are not alkaline, and that alkalies are powerful antiseptics. Yet the baronet could not draw the conclusion from all these discoveries, that *putrid or septic exhalations were acid*, nor that *the pus of foul ulcers was an acid;* but we have done it for him, and shown that these, like other effluvia from filthiness, are the exciting causes of malignant and pestilential disease. I think it not necessary to say more on the subject. For my own part, I stand convinced, and I most sincerely hope the above mentioned facts will

tend to clear up the doubts of the incredulous, and universally to establish your doctrine.

" RICHARD L. WALKER, H. S.

" Dr. SAMUEL L. MITCHILL."

I afterwards reflected further on the subject, and extended my inquiries to the discovery, whether the sweat was ever secreted in an acid state. I have no reason to believe it is, but, on the contrary, am of opinion, that though it is possible a *morbid* sweat may be sour, still generally the acid quality of the sweat is not produced until some time after secretion, when it has been a considerable time exposed to the atmosphere and has attracted oxygen from it. The rusult of these inquiries are contained in the following letter to Professor HOSACK.

" *New-York Hospital, Nov.* 16, 1801.

" SIR,

" In consequence of the publication of the experiments which I made in June last, and communicated to Dr. MITCHILL, on the acidity which the pus of venereal, cancerous, scrophulous and other ill-conditioned ulcers acquired some hours after secretion,* you have requested me to make further experiments for ascertaining whether other secreted fluids are not acid at the

* Med. Rep. vol. v. p. 85.

time of their secretion, or whether they become so by exposure to the atmosphere.

" The perspirable matter of the skin was suggested as worthy of being made the subject of experiment.

" I knew it was a common observation among washerwomen, that the shirts and trowsers of hard-working men, in the summer time, would smell sour in the course of a week's wearing: I had read somewhere of sour sweats having been observed in some diseases, and I had heard some respectable physicians express a belief that the secretion of the skin was naturally and always of an acid quality.

" To ascertain the truth of these opinions, I put a piece of delicate litmus paper upon the skin of a sailor near the arm-pit, who laboured under an intermittent fever. He was just admitted into the Hospital, and was in a foul and filthy condition. To prevent any communication with the oxygen of the atmosphere, I covered the paper accurately with sticking-plaster, and suffered it to remain on the skin for twenty-eight hours. On examination, at the end of that time, I found that it exhibited signs of having been soaked or loosened a little in its texture, but had not suffered any alteration whatsoever of its colour.

" Afterwards I selected four other patients in different diseases, whose skins were in a moist

state from perspirable matter, and carefully applied litmus paper, as before described, to a portion of skin on each of them; but though I examined them very exactly, and asked the opinion of several other persons on some of them, I could not discover that there was any token of acidity. I am hence apt to believe, Sir, that sweat is not sour at the time of its secretion, and that it does not become acid within less than one natural day after it has been poured out from the vessels which prepare it. The presence of the oxygenous air is, without a doubt, necessary to the conversion of this to the state of an acid, and as the adhesive plaster which I put on was interposed between the perspired fluid and the atmospheric oxygen, the process of acidification must have been proportionably retarded.

" In the case of seamen and labourers' clothes long worn, soaked through and through with sweat, exposed for a sufficient time to the air, there is a conversion of the natural secreted humour to an acid often possessing unhealthy qualities.

" The perspired matter never becomes venomous that I know of, or believe, until it has been exposed long enough to become oxydated: then, and not till then, it seems to acquire its pernicious and fever-producing qualities. Hence it will appear, that when a seaman's chest of clothes, or

any thing of that kind, is found to contain so much of this acid as can poison the persons who are exposed to it in its recent and undiluted state, there is frequent mistakes committed in affirming such a virus to have been imported from beyond the sea, or derived from distant countries; for, in fact, the noxious agent is produced *within* the chest, and on board the vessel, by chemical changes going on among the particles of secreted matter inhering in the cloathing therein contained.

" I remain, Sir, with high respect,

" Yours, &c.

" RICHARD L. WALKER, H. S.

" Dr. HOSACK."

SECTION II.

Of the Perspiration in a State of Disease.

HAVING given a summary account of the perspiratory functions in a state of health, it is next proper to consider its morbid conditions. These may be arranged in three divisions, to wit:

I. Impeded perspiration;

II. Excessive excretion of natural sweat; and,

III. Morbid qualities of the perspired fluids.

1. *Of impeded Perspiration.*

This state of the skin is judged of by its increased heat and dryness; for, when the perspirable matter is not secreted and discharged as it ought to be in health, the skin, ceasing to be bedewed with moisture, becomes incapable of carrying off the redundant heat of the body as fast as is necessary and comfortable.

The cases in which this takes place are twofold; first, dryness of the skin, accompanied with diminished excitement of the arterious system; and, secondly, dryness, attended with an increased action of the blood vessels. To the former of these heads belong the cold fit of fevers, palsy, chronic rheumatism, syphilitic cachexy, and that condition of the skin which accompanies old age. To the latter are to be referred the hot fit of fevers, acute catarrh, small-pox, measles, acute rheumatism, pneumonia, the common diathesis of yellow fever and plague, and that condition of the cutaneous surface which accompanies the incipient state of certain dropsical and diabetic disorders.

When the skin becomes dry from *too little* arterious stimulus, it can frequently be relieved, in some degree, by external warmth. A warm season thus affords great relief in many such cases, and the living in, or removal to, a more southern re-

gion, renders that benefit permanent to many delicate constitutions. In cooler weather the same effect may be produced or promoted by warm cloathing, and particularly by flannel worn next to the skin; and more powerfully still by the stimulant and detergent operation of the warm bath, or by watery vapours and fomentations admitted to the skin. An attempt has lately been made to promote the perspiratory discharge, by putting an arm or a leg into a convenient oblong vessel, made very tight, and withdrawing a part of the pressure of the atmosphere by means of an air pump; and this is said to have produced remarkable effects.

Friction, either by the naked hand or by aid of the flesh brush, may be ranked among the sudorific remedies, operating by stimulating the cutaneous vessels, and making them more promptly and perfectly perform their functions. This operation of rubbing is rendered more efficacious when some mild ointment is at the same time applied. An unguent or oily application has the powers of softening the cuticle, and lessening its hard and horny stiffness; it prevents the chafing and irritation which sometimes arise from dry friction; and it frequently so relaxes spasm, stimulates the vessels, and opens the pores, that the sweat flows in abundant quantity. This is amply proved by the late experiments for curing the

plague in Egypt and Asia Minor, by unction with olive oil, which, when discreetly and sufficiently rubbed upon the whole surface of the body, oftentimes causes a plentiful perspiration to break out, to the great advantage of the sick. And from some experiments made, anointing with oil promises to be of great service as a sudorific in yellow fever.

In the Philosophical Magazine for December, 1798 (p. 257), the following description is given from Von Berchtold, of the manner in which frictions with oil have been used at the hospital at Smyrna with very great success. "This excellent cure for the plague consists in rubbing olive oil, with the strongest friction, into the whole body of the infected person. When the body is thus rubbed, the pores being opened, imbibe the oil, and a profuse perspiration takes place, by which the poisonous infection is again thrown out. This operation must be performed the first day of the infection; and if only a weak perspiration ensues, it must be repeated till it is observed that every particle of infection is removed, and that the whole body of the patient is covered with a profuse sweat. Neither the patient's shirt, nor bed-clothes, must be changed till the perspiration has entirely ceased. The operation must be performed in a very close apartment; and at every season of the year there must be kept in it a fire-

pan, over which sugar and juniper must be thrown from time to time, that the vapour which thence arises may promote the perspiration. The whole body of the patient, the eyes alone excepted, must in this manner be anointed, or rather rubbed over with the greatest care."

Hence we understand the use of friction and unguents in diseases of debility, attended with a dry skin; and where high stimulation is necessary, the addition of sinapisms, rubefacients, blisters, and cauteries can be explained. To the same head of provoking a discharge from the skin, in lieu of sweating, can a part of the effects of setons and issues be ascribed.

If the skin becomes dry from too much excitement, in disorders of the phlogistic diathesis, it is a question of delicacy how the constitution ought to be managed. There is a peculiar dread of cold among all people who speak the English language. By a grievous mistake, incidental to no other tongue spoken in the world, *cold* is considered as a word of similar import with the catarrh of the Greek physicians; and by a most unhappy perversion and extension of the word "cold," it has been considered by those who think and speak in English, as the cause and parent of almost all the diseases of the human frame. And conformably to this mode of considering the matter, we find almost every malady referred by the speakers of

the English language and their physicians, " to catching cold." This however is an unhappy delusion, and much toil and difficulty must be employed to shake it off; though it may be justly feared whether we shall ever get rid of the deception entirely until the phraseology is altered.

But though the phraseology remains, something has been done in *fact*. The introduction of the cool regimen in small-pox has been adopted after the most violent opposition that the strongest prejudices of the great body of physicians and people could raise against it. Here cool air promotes perspiration, allays inflammation, and lessens febrile action. The beneficial effect of exposure to the cool atmosphere in what has been called the *air-bath* is wonderfully salutary and refreshing.

In like manner the cool treatment of yellow fever and other violent febrile affections, has received of late the sanction of the most correct and able practisers; and the benefit done to the sick, by frequently washing the whole body with cool water, amply proves how agreeably it disposes the fluids of the skin to transpire.* The cooling regimen is coming into use in the measles, and with great advantage to the patients; for it

* Dr. Hamersley's Lectures on the Practice of Physic.

may be observed, that much of the mortality of that disease is owing less to an inherent malignity in the morbillous poison, than to the preposterous, hot and stimulant manner of treating it. In active catarrh also, cool air, cool water, cool diet, and the adoption of a spare regimen, are of wonderous service, by promoting perspiration, unloading the blood vessels, and restoring the equilibrium of the system; while the most pernicious consequences follow the heating, stimulating and violent method of cure vulgarly employed. Well might the author of the Brunonian doctrine denominate this a "*heat*" rather than a cold!

From these facts, and from the benefit derived from cold bathing in acute rheumatism, it will be apparent that the dryness and huskiness of the skin which arise from too great excitement, may be best removed by lowering the temperature, and thereby promoting the perspiratory discharge.

Different is the case *when the sweating surface* of the body is suddenly exposed to cold air or cold water. Then the further secretion of perspirable fluid is quickly checked, the vessels become torpid, the functions of the extreme arteries of the skin are imperfectly performed, and a universal refrigeration ensues. In these instances, severe disorders often follow. Some-

times almost a sudden death has succeeded the imprudent immersion *of a heated and sweating* body in cold water. At other times, by an association of internal with external morbid actions, the lungs have suffered from the injuries sustained by the cuticular surface, or the intestines have sympathized with the malady of the external parts; or the muscles have become diseased by a similar affection, derived from the contiguous skin; and in these modes have a deadly torpor, or pleurisy, peripneumony, an enteritis or dysentery, a catarrh or a rheumatism, been excited in the constitution of healthy persons.

Thus may cold do direct injury when acting upon a *sweating surface;* but it may be asked how catarrh, acute rheumatism, and other inflammatory affections can be accounted for without having their origin in *cold?* The reply is easy and plain. The refrigerated state of body is only a *predisposing* cause, and renders the system more liable to be acted upon by succeeding heat. Now, if the body is very cold, and in that condition suddenly receives the action of great external heat, it will probably be excited to a morbid degree, and coughing, sneezing, hoarseness, and perhaps even symptoms of pneumonia, as well as of catarrh, may be the consequence.

The transition from cold to heat in such cases ought to be slow and gradual, that the stimulus

may not be too violent, but the body prepared for its action by degrees; just as when limbs, noses and ears are frozen, it is well known that great and sudden heat will dispose them to gangrene and mortification, but when admitted in gentle and equal degrees, their recovery to health is almost certain: in common, therefore, cold is only the *predisposing* cause of catarrh and the kindred diseases, and the *exciting* causes are *heat*, and other stimulants, such as gin, ardent spirits, and the like.

2. *Of the increased Secretion of Natural Sweat.*

Labour is the most common and obvious mode of increasing this discharge. A working man is both depleted and cooled by his perspiration and sweat. To supply the waste and loss occasioned by them he grows thirsty and takes drink. The constitution so replenished perspires the more, and as this excreted matter passes off into vapour the sensible heat of the body is turned to a latent state, and an agreeable temperature preserved; thereby the system preserves its equipoize of heat. Excessive sweating by labour thins and impoverishes the body.

Excessive sweating, though of a temporary duration, is a frequent occurrence in *intermittent fevers*. After the cold and hot stages are past,

there often comes on what is denominated the sweating stage of the fit. In this the suspended secretions are restored, and perform their functions with such freedom, that some of the secretions, especially the sweat, are prepared in more than their accustomed quantity. This plentiful flow of sweat cools the body after the hot stage, restores moisture to the parched skin, and relieves by a seasonable depletion of the vessels. Where the quantity secreted is not very great, sweating may be deemed a wholesome evacuation; but it sometimes proceeds so far as to debilitate and do injury, as in hectic fever. For example:

Hectic fever is a form of intermittent; only instead of deriving its exciting cause from the external air, or any outward source, it is engendered within the body itself. On the surface of ulcerated tubercles, of large ulcers, and denuded sores, there is often formed an acid material, whose absorption stirs up fever; and from this fever-producing stimulous does hectic fever acquire its peculiar form and type, being but a modification of intermittent. The sweat is produced in the same way, and upon the same principle; but the frequent and profuse repetition of it frequently weakens the patient excessively by its *colliquative* discharge.

Sometimes the skin is prone to sweat, without the presence of the febrile action or of labour.

The vessels are either too active or too lax, and pour forth too great a quantity of perspirable matter. This is so considerable as to render the cloathing of the persons subject to it very wet during the hours of sleep, and even of waking. When long continued it exhausts the system by its debilitating effects, and renders the body cold, chilly, and predisposed to various more serious diseases. This excessive sweating, called *Epidrosis*, is the object of various medical prescriptions, bitters, sulphuric acid, friction, bathing, and the like.

There is sometimes a "*cold sweat*," which ought here to be mentioned. This usually occurs in diseases of great languor; and, on the approach of death, it seems to be explicable in this way. In a healthy state, part of the *perspiration is doubtless absorbed* into the body, and the rest, by far the greatest part, exhaled into the atmosphere, or imbibed by the cloathing; the absorbed part unquestionably answers some valuable purpose in the animal economy. In the case of cold sweat, the vis vitæ failing, and the vital heat diminishing, the perspired matter cannot be completely turned to vapour, and therefore remains in drops on the cold skin: at the same time the power of the lymphatic absorbents becoming nearly extinct, little or none is inhaled, and, consequently, it remains stagnant on the surface.

3. *Of Morbid Sweats.*

Sometimes the arm-pits of healthy persons afford a fœtid and offensive discharge. Negroes are remarkable for secreting a rank sweat from every pore of their bodies. It is said that sweat is sometimes of a phosphoric quality, rendering the back and sides luminous when rubbed, and imparting to the linen stars of phosphoric acid. Indeed, pathologists have affirmed that *sour* sweats have sometimes broke out in the course of febrile diseases. At certain times the perspired matter abounds with an uncommon quantity of salt, as happened to a Negro man in the New-York Hospital, whose skin, before death, was covered with a saline efflorescence, as if sprinkled from a powdering box.

It is not necessary to affirm that *acid* sweats never happen, but it is probable that a sourness, acquired *after* secretion, has been mistaken for a humour acid at *the time of secretion.*

SECTION III.

On the Degeneracy of perspired Fluids to Infection and Pestilence.

SANCTORIUS, in his Medicina Statica, aphorism 53, has these remarkable words: " Imperceptible perspiration lightens the body more than

all the sensible evacuations put together; for, after sleep every one may perceive himself lighter, without any of the *sensible* secretions, because he is really so by about three pounds." This conclusion, which that correct experimenter drew, was not a random guess, but a fact determined with all the accuracy of the balance.

Such a vast quantity of perspired matter constantly exhaling from the skin, would do little more than unload or lighten the body if it went fairly off. The human body, however, is generally covered with cloathing, which hinders these secreted fluids from making their entire escape. Entangled in the woollen, cotton, or linen materials of which the garments are made, they remain in contact with the body, and in time daub and besmear it with filthiness. The perspired matter exposed to the influence of atmospheric air, in a degree of heat equal to the human skin, degenerates into various new compounds, and certain parts of it turn to septic or pestilential matter. Those poisonous compounds, so formed, re-act upon the body which produces the ingredients of which they are formed, and become the exciting cause of various diseases.

But as this matter has been minutely investigated by Dr. MITCHILL, I shall pursue the inquiry by quoting the words he has made use of in the third volume of the Medical Repository, p. 161 & seq.

" But this adipose secretion is by no means a *pure oil.* According to circumstances, it is occasionally blended with *phosphoric, sulphuric, septic,* and a surplusage of *carbonic* matter.

" And it is further altered, as far as its nature will permit, by the constant transmission of that AQUEOUS FLUID, the INSENSIBLE PERSPIRATION, through the cuticle, and by the drops of SWEAT into which it is sometimes condensed; both formed by a coalition of a portion of the phlogiston (hydrogen) of the blood, with a parcel of its oxygen, and this liquid serving as a menstruum for certain other substances. The exceedingly great quantity of perspired matter incessantly passing off from every exhalant pore of the skin, leaves behind, as it evaporates, some of its more fixed, saline, and feculent parts, along with, or upon, the greasy covering of the cuticle. A portion of carbone, phosphorus, and septon, with, sometimes, an overplus of oxygen, seem to accompany this effusion of the skin, and, in some quantity, to remain behind, after the water has evaporated.

" It was remarked before, that the cuticle was insensible, bibulous, and, of course, exceedingly apt to grow nasty. How can it be otherwise? The cuticle has neither nerves nor blood-vessels, and there is little or no reason to believe that it possesses organization. It is, therefore, in strict-

ness, less a part of the living body than a kind of tight shirt, or close-setting tunic, drawn over the whole surface of the body. This shirt or tunic of cuticle may be considered as a foreign wrapper, or piece of natural cloathing; and, like every other foreign thing which enwraps the body, is liable to become charged with such substances as are excreted from the TRUE SKIN within it. The foulness of this NATURAL SHIRT is a frequent occurrence. Almost every body lets it get nasty. When the nastiness is very considerable, the poisonous or stimulant matter entangled there, irritates or inflames the organ of feeling, with which it lies in contact, and produces various itchings, pimples, eruptions, blotches, tetters, sores, &c. being a PRINCIPAL CAUSE of the distempers of the skin. To a correct mind *a dirty cuticle will appear to be a dirty shirt.* If the former could be stripped off, and cleansed in the wash-tub, like the latter, there might possibly be a convenience in it. This is, however, of small moment, since we know the cuticle can be well cleansed without being taken off.

" The modern use of white linen and cotton, as articles of raiment, enables us to judge, with tolerable accuracy, what material it is which shirts, made of those kinds of cloth, and worn next the cuticle, receive from the PERSPIRATION and SWEAT. What the garments imbibe must

have passed first through the exhalant arteries or excretory ducts, then undergone a further change while remaining in and about the CUTICLE or FIRST SHIRT, and afterwards have been transmitted, by rubbing or wiping, to the linen fibres or cotton filaments OF THE SECOND. The animal matter which befouls the OUTER SHIRT is a good indication of that which adheres TO THE INNER: for, as clean linen and cotton become soiled very soon by lying in contact with any part of the human body, what they receive must be principally derived from the cuticle which they touch and absterge.

" The uncleanness of SHIRTS, DRAWERS, and STOCKINGS, may, therefore, be deemed to be matter wiped from the CUTICLE, and derived to the cuticle from the vessels and ducts of the subjacent TRUE SKIN. An examination, then, of the facts relative to cloathing grown foul by long wearing next the cuticle, may be considered as virtually an examination of the cuticle itself, and of the excreted matters which stick to it."

It is unnecessary to make larger quotations from Dr. MITCHILL's paper on this subject, as every one can have access to the Medical Repository. The Doctor attempts to prove that yellow fever is frequently produced by the accumulation of the excreted perspiration on the surface of living bodies, and its condensation into cloathing.

He also attempts to prove that from the local operation of this excretion on the surface, a variety of local cuticular diseases may be produced, and that alkalies are the sovereign cure for their removal. There may be much truth in these general remarks, which were certainly suggested by other physicians long before the Doctor wrote upon the subject. The Doctor appears to have very confused and incorrect ideas on the subjects which he generally treats of; he endeavours to prove that this excretion, thus vitiated, is febrile infection; but with all due respect to so great an authority, I beg leave to remind the Doctor, that the term *infection* must always be considered, in the language of Dr. JACKSON, "as a diseased animal secretion." In other words, it is a process of the living system under the operation of febrile action; *infection* and *contagion*, therefore, convey the same idea. The Doctor appears also to have fallen into a very great mistake, in supposing the vapours arising from putrid vegetable and animal matter, and those from the lungs and surface of the body in malignant fevers, to be precisely the same. An assertion of this kind, not proved by any direct experiment, and scarcely supported by loose analogical reasoning, can never gain general credit. I am well convinced that there is an essential difference between the infection of fever and the *specific* infection of measles

or small-pox; but [illegible] does this attach to the terms *infection* and *contagion* a different meaning? Fevers may be produced by an accumulation of the perspired fluids collected in any considerable quantity about the living system; so also may they be produced by the vapour arising from putrid matter. Nay, we may go still further, and incontestibly prove, by daily and repeated experience, that fevers very generally arise from the mere vicissitude of weather in relation to heat or cold, moisture or dryness; yet it would be extremely incorrect to call all these causes of fever *infections*. Chemists have yet to discover the nature of febrile infection, and of the specific infections of particular diseases. Were the perspiration of the skin and of the lungs unaltered by any particular process of the living system, to be so commonly the cause of fever, as Dr. MITCHILL seems to think, we should as readily receive the infection of fever from a person sweating under the use of sudorific medicines in a case of pleurisy or acute rheumatism, as in the most malignant form of fever; but this is not the fact. I appeal to the experience of every physician for the truth of what I now assert. In ordinary cases we enter the crowded apartments of the sick in jails, hospitals, &c. without hazard; but wherever malignant fevers prevail, the risk of giving to the sick the attentions which our professional du-

ties require, becomes more serious. It is true that, wherever cleanliness, ventilation, &c. can be pursued in pure air and in spacious apartments, the infection of fever may be entirely lost or dissipated in the atmosphere; but it has also been observed in hospitals, where every attention has been paid to keep the wards clean, to supply plenty of clean bed linen and body linen to the sick, and where the sick themselves have frequently been washed; that even under these circumstances it has sometimes been very difficult to destroy a highly malignant and concentrated infection. In such cases it is usual to detach those labouring under any malignant form of fever from the other patients; they are generally placed in distinct apartments, or in a ward by themselves, which is called a fever-ward. The nurses, physicians, and other attendants, may, from the power of habit, resist the operation of the febrile infection, and all perform their appropriate duties to the sick. The infection spreads to a very small distance from the body of the patient, and the other apartments of the house may be entirely exempt from it. Under these circumstances the other wards may be visited, where there are numerous sick labouring under other diseases, by persons coming from a much purer air, without danger; but if such persons should approach the sick in the fever-ward, and

remain near them even for a few minutes, they will very generally become the victims of a highly malignant and infectious fever.

All the theories and speculations of chemists on the nature of the pestilential virus, or febrile contagion, want more experience to establish any one of them in general practice. Of these the opinions of MORVEAU and CARMICHAEL SMYTH are certainly entitled to most attention, and have gained most credit among the well informed part of the profession in our country, as well as in Europe. In the writings of these gentlemen we see correct reasoning supported by fair experiment; they appear to be the result of candid and fair inquiry; yet, as I have before remarked, more experience is required to establish them.

THE END.